Elastic and Rheological Properties of Magnesium Oxide at High Pressure and High Temperature	X17B1

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We have carried out a preliminary experiment to study the elastic and rheological properties of magnesium oxide under high pressure and high temperature using simultaneous X-ray diffraction and ultrasonic measurements in a DIA-type cubic anvil apparatus (SAM85) installed at the superwiggler beamline X17B1 at NSLS in Brookhaven National Laboratory. A polycrystalline MgO with polished ends was inserted into the center of the cubic boron epoxy pressure medium. Polycrystalline alumina rods were used as pistons for sample deformation as well as buffer rod for acoustic measurements. We obtained the differential stresses applied onto the sample from the peak shit of the X-ray diffraction spectrum and the elastic anisotropy of the sample. The axial strain of the sample at high pressure and high temperature was monitored by the measurement of travel time as a function of time. Preliminary analyses showed the feasibility of characterizing the stress environment of the sample at high pressure and high temperature. The differential stresses reached 20 kbar at 10 GPa (200 bar oil load) and room temperature (Fig. 1). Experiments with improved cell design have been planned in next available beamtime.

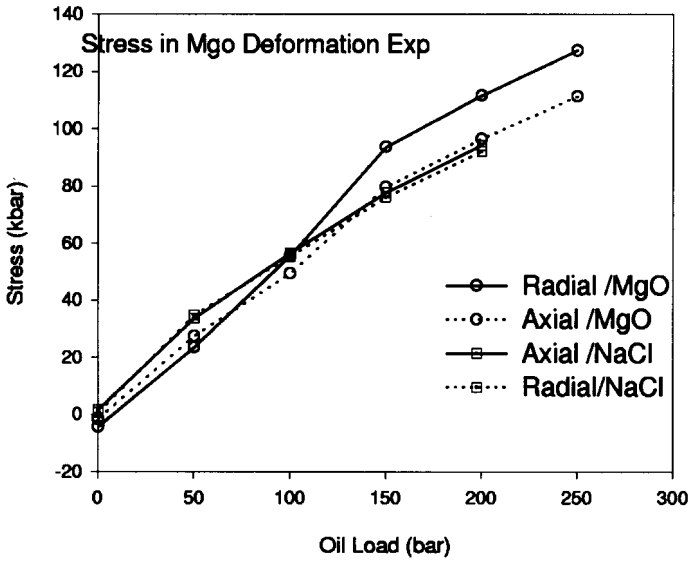

Figure 1. Stresses in axial and adial directions for MgO and NaCl.